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# **HATCHERY EVALUATION REPORT**

**Lewis River/Speelyai Hatcheries - Coho (Type S)**

**March 1997**

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**Integrated Hatchery Operations Team (IHOT)**

# **HATCHERY EVALUATION REPORT**

## **Lewis River/Speelyai Hatcheries - Coho (Type S)**

### **An Independent Audit Based on Integrated Hatchery Operations Team (IHOT) Performance Measures**

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Project Number 95-2  
Contract Number 95AC49468

March 1997

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## Executive Summary

This report presents the findings of the independent audit of the Lewis River/Speelyai Hatcheries - Coho (Type S) program. The hatchery is located adjacent to the Lewis River, 3 miles downstream from Merwin Dam, about 8 miles east of Woodland, Washington. Speelyai hatchery is operated as a satellite facility to the Lewis River Hatchery. It is located in a mountainous area at the upper end of Lake Merwin on the Lewis River, approximately 21 miles east of Woodland. The hatchery is used for adult collection, incubation, and rearing of spring chinook, early coho (Type S), and late coho (Type N).

The audit was conducted in 1996-1997 as part of a 2-year effort that will include 67 hatcheries and satellite facilities located on the Columbia and Snake River system in Idaho, Oregon, and Washington. The hatchery operating agencies include the U.S Fish and Wildlife Service, Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, and Washington Department of Fish and Wildlife.

### Background

The audit is being conducted as a requirement of the Northwest Power Planning Council (NPPC) "Strategy for Salmon" and the Columbia River Basin Fish and Wildlife Program. Under the audit, the hatcheries are evaluated against policies and related performance measures developed by the Integrated Hatchery Operations Team (IHOT). IHOT is a multi-agency group established by the NPPC to direct the development of new basinwide standards for managing and operating fish hatcheries. The Bonneville Power Administration (BPA) contracted with Montgomery Watson to act as an independent contractor for the audit.

IHOT has established five basic policies that cover: (1) hatchery coordination, (2) hatchery performance standards, (3) fish health, (4) ecological interaction, and (5) genetics. The audit focuses on all these policies, with the exception of hatchery coordination. These policies are set forth in *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1995)*. That document is the source for the performance measures that are the basis of this audit.

### The Audit Process

The audit was based on the facility management's response to a 109-page questionnaire. This audit form was completed through a five-step process in which:

- Information was obtained from headquarters.
- The hatchery manager was asked to fill out and return the audit form.
- A 1-2 day site audit visit was conducted to inspect facilities, review hatchery records, discuss audit form responses, and develop remedial action plans.
- A compliance report was developed to document the compliance status of each performance measure. This report was then shared with the hatchery manager and IHOT representative.
- This hatchery evaluation report was written to document compliance with IHOT performance measures and develop cost estimates for remedial actions when needed.

## **Lewis River/Speelyai Hatcheries - Coho (Type S) Results**

The Lewis River facility includes 12 concrete raceways, 2 rearing ponds, and incubation facilities. The Speelyai facility includes 1 adult holding pond, 12 concrete raceways, and 1 rearing pond. Lewis River and Speelyai hatcheries were originally constructed to provide mitigation for hydroelectric system development in the Lewis River System. An almost total remodel at Lewis River Hatchery was funded with state enhancement funds in 1979 and 1980. The goal of the hatchery is to produce adult coho and spring chinook that will contribute to NE Pacific and Columbia River Basin sport and commercial fisheries.

The Lewis River/Speelyai Hatcheries - Coho (Type S) program was in general compliance with most of the performance measures. In the area of program objectives, the hatchery was not meeting its adult return goal. The audit found that the hatchery was not in compliance with the screen approach and screen mesh criteria, temperature criteria, water quality monitoring requirements, and pathology-free water criteria, which are all facilities requirements. The hatchery was not meeting the flow criteria for incubation, the loading criteria for raceways at Lewis River Hatchery, the loading criteria for the Lewis River Hatchery rearing ponds, and space and flow criteria for the Speelyai rearing ponds. The hatchery needed to develop specific incubation and rearing standards for the IHOT Operations Plan, smoltification goal, and smoltification monitoring plan. The hatchery was also not meeting all the alarm, food storage/quality control, transportation facilities, and sanitation requirements. The hatchery did not have a Genetics Monitoring and Evaluation Program. The hatchery needed to construct acclimation ponds for the fish released in the Upper Columbia River Basin.

The specific areas in which the Lewis River/Speelyai Hatcheries - Coho (Type S) program requires remedial actions based on the IHOT performance measures are listed below. These remedial actions are listed in alphabetical order without intent of ranking or otherwise assigning priority:

- Check flow alarms daily
- Build acclimation ponds for fish released in upper Columbia River Basin
- Conduct IHOT QA/QC tests for feed preparation
- Develop approved genetics M&E plan
- Develop smoltification goal and monitor
- Develop specific incubation and rearing standards for the IHOT Operations Plan
- Follow IHOT incubation flow criteria or revise
- Follow IHOT protocols for disinfection of interiors and exteriors of transport vehicle
- Install security alarms at Lewis River and Speelyai Hatcheries
- Purchase telephone pagers for 8 staff
- Reduce program at Speelyai Hatchery or revise piping system to provide more water to the raceways
- Reduce program at Lewis River Hatchery or revise piping system to provide more water to the rearing ponds
- Reduce program at Speelyai Hatchery or provide additional space and flow for the rearing ponds
- Replace screens at Speelyai Hatchery
- Run analysis for water quality parameters, turbidity, alkalinity, hardness, nitrite, and contaminants

- Sanitize equipment and rain gear utilized in broodstock handling or spawning prior to its use elsewhere in the hatchery
- Sanitize rearing vessels after fish are removed and prior to introducing a new fish lot or stock

Non-compliance issues resulting from items beyond human control or Performance Measures not relevant to this hatchery (Type 1 in Table 3, Section 4 of this report) were not listed above.

## Facility Description

<b>Name:</b>	Lewis River and Speelyai Hatcheries
<b>Stock/Species:</b>	Spring Chinook Coho (Type N) Coho (Type S)
<b>Operating Agency:</b>	Washington Department of Fish and Wildlife
<b>Funding Agency:</b>	PacifiCorp NMFS (Mitchell Act)
<b>Location:</b>	The hatchery is located adjacent to the Lewis River, 3 miles downstream from Merwin Dam, about 8 miles east of Woodland, Washington. Speelyai hatchery is operated as a satellite facility to the Lewis River Hatchery. It is located in a mountainous area at the upper end of Lake Merwin on the Lewis River, approximately 21 miles east of Woodland.
<b>Address:</b>	4404 Lewis River Road Woodland, WA 98674
<b>Hatchery Manager:</b>	Mr. Robin Nicolay
<b>Phone:</b>	(360) 225-2120
<b>Fax:</b>	(360) 225-6330
<b>Purpose:</b>	Lewis River and Speelyai hatcheries were originally constructed to provide mitigation for hydroelectric system development in the Lewis River System. An almost total remodel at Lewis River Hatchery was funded with state enhancement funds in 1979 and 1980. The goal of the hatchery is to produce adult coho and spring chinook that will contribute to NE Pacific and Columbia River Basin sport and commercial fisheries.
<b>Production Goal:</b>	<b>Lewis River Hatchery Production</b>  <b>Spring Chinook</b>  Produce 900,000 yearlings for on-station release  <b>Coho (Type N)</b>  Produce 2,100,000 yearlings for on-station release  Provide 50,000 eggs to co-op programs  Provide eggs and fish to other facilities

### **Coho (Type S)**

Produce 1,400,000 yearlings for on-station release

Produce 1,000,000 yearlings for upriver release

Produce 870,000 yearlings (from Speelyai Hatchery) for on-station release

Provide 14,000 eggs to co-op programs

Provide eggs and fish to other facilities

### **Speelyai Hatchery Production**

#### **Spring Chinook**

Rear 315,000 spring chinook yearlings for transfer to Lewis River Hatchery

### **Coho (Type S)**

Produce 200,000 yearlings for release into Lake Merwin

Provide 31,000 eggs/fish to co-op programs

Produce 870,000 yearlings (from Speelyai Hatchery) for on-station release

Provide 870,000 eyed eggs to Lewis River Hatchery

### **Water Supply:**

Lewis River Hatchery water rights total 38,613 gpm from three sources: the Lewis River, an unnamed stream, and Colvin Creek. Speelyai Hatchery water rights total 6,732 gpm from Speelyai Creek.

### **Facilities (Lewis River Hatchery:**

Adult Holding:	None
Incubation:	80 10-tray vertical stack incubators (800 trays)
Early Rearing:	5 deep troughs
Raceways:	12 concrete raceways - 4,000 cf each

**Facilities (Speelyai Hatchery):**

Adult Holding:	1 asphalt adult holding pond - 18,000 cf
Incubation:	50 10-tray vertical stack incubators (500 trays)
Early Rearing:	1 deep trough
Raceways:	12 concrete raceways - 7,200 cf each
Rearing Ponds:	1 asphalt rearing pond - 18,000 cf

## Section 3

# Compliance Status

The hatchery audits are based on compliance with written IHOT performance measures. These performance measures are documented in *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (referred to as *IHOT 1995* in this report).<sup>1</sup> The purpose of the performance measures is to implement new basinwide policies that provide regional guidelines for operating anadromous hatcheries in the Columbia Basin.

The audit focuses on performance measures for IHOT policies that cover (1) hatchery performance standards, (2) fish health, (3) ecological interaction, and (4) genetics. These performance measures are intended to guide hatchery operations once production is established. For that reason, the hatchery operations audit included broodstock collection, spawning, incubation of eggs, fish rearing and feeding, fish release, equipment maintenance and operations, and personnel training. Production priorities are beyond the scope of this audit.

Based on *IHOT 1995*, a detailed 109-page audit form was developed. The audit form divided the performance measures into six major sections along major program and technical criteria areas. Two additional sections (sections 1 and 8) include general information and expenditure information needed for this Hatchery Evaluation Report and blank forms for additional comments. The following is the basic structure of the IHOT audit form:

Section 1	Performance Measures for General Information and Expenditure Information (PMs General 1-2)
Section 2	Performance Measures for Program Objectives (PMs 1-4)
Section 3	Performance Measures for Facility Requirements (PMs 5-15)
Section 4	Performance Measures for Hatchery Practices (PMs 16-25)
Section 5	Performance Measures for Fish Health Policy (PMs 26-34)
Section 6	Performance Measures for Ecological Interactions (PMs 35-38)
Section 7	Performance Measures for Genetics Policy (PMs 39-43)
Section 8	Blank Forms for Additional Comments.

Several performance measures are repeated in various sections of the audit form. These performance measures overlap in *IHOT 1995* and were retained to allow individuals interested in specific portions of the audit (such as Genetics or Fish Health) to determine the compliance status of all performance measures for a given topic in one location. A repeated performance measure is indicated by shaded text.

## The Hatchery Audit Process

The hatchery audit will be conducted over a 2-year period that concludes in 1997. At each hatchery, a five-step process was used to complete the overall hatchery audit. This process

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<sup>1</sup>Integrated Hatchery Operations Team (IHOT) 1995. *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries*, Bonneville Power Administration, Portland, Oregon.

consisted of research and onsite visits. The site visit at the Lewis River/Speelyai Hatcheries was conducted on March 10, 1997.

The following is the five-step audit process:

1. Information was obtained from headquarters.
2. The hatchery manager was asked to fill out and return the **Audit Form**.
3. A 1-2 day site audit visit was conducted at each hatchery. During that visit an audit team inspected facilities, reviewed hatchery records, discussed audit form responses, and developed remedial action plans when appropriate.
4. During the site visit, the compliance status of each performance measure was discussed with the hatchery manager and IHOT representative. A portion of the Hatchery Evaluation Report was sent to the hatchery manager following the audit visit as a **Compliance Report**. That Compliance Report is Table 2 of this report.
5. Information from steps 1-4 was used to prepare a draft **Hatchery Evaluation Report**. This draft report was submitted to the operating agencies for review of the information used to determine compliance. Based on review and comments, a final Hatchery Evaluation Report was developed. The final report documents the compliance of a particular hatchery with the IHOT performance measures and presents cost estimates to correct any deficiencies.

## **Compliance Status of Lewis River/Speelyai Hatcheries - Coho (Type S)**

The following table includes information on life-stages that are held on this facility for some portion of their rearing cycle (Table 1). For multi-facility programs, summary cost and contribution data is presented at the facility where rearing occurs. For the compliance status relating to performance measures that do not occur at this hatchery, please refer to the Hatchery Evaluation Reports for the hatcheries and stocks listed in Table 1. A check mark (✓) indicates that the specific life-stage is held at this facility.

This section documents the compliance status of the Lewis River/Speelyai Hatcheries - Coho (Type S) program. Each performance measure is presented in a table taken from the audit form (Table 2). The compliance status is identified by the following categories:

- **N/A** (not applicable)
- **Yes** (in compliance)
- **?** (unknown; generally due to unavailability of information to determine compliance)
- **No** (not in compliance).

Remedial actions are suggested for performance measures not in compliance. These remedial actions are grouped into categories and listed in Section 4 of this report, where the cost of the required remedial actions is also presented.

**Table 1 Summary Program Information for Lewis River/Speelyai Hatcheries - Coho (Type S)**

Component	Location of Adult Holding, Spawning, Incubation, and Rearing					
	Merwin Dam/Lewis River Hatchery	Speelyai Hatcheries	Lewis River Hatchery	Klickitat and Yakima Rivers	Lake Merwin (from Speelyai)	
Adult Collection	✓					
Adult Holding		✓				
Spawning		✓				
Fertilization		✓				
Incubation						
green-to-eyed		✓				
eyed-to-hatch			✓			
Rearing						
fry			✓			
fingerlings			✓			
smolts			✓			
Acclimation/release			✓	✓	✓	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
the hatchery programs outlined in a subbasin management plan?		✓			Columbia Basin System Planning Production Plan, FERC Agreement 953-000, and US v Oregon	
ie hatchery operating under a current hatchery rational plan?		✓			IHOT Operations Plan	
s it understood by staff?		✓				
s it being followed?		✓				
hatchery monitoring and evaluation plan in place?						
o you have a written monitoring and evaluation plan?		✓				
ult contribution to fisheries, spawning grounds, and chery		✓			Review of records	
ult pre-spawning survival as compared with blished goal		✓			Review of records; in compliance 3 out of last 3 years	
ake as compared with established hatchery goal				✓	Review of records; in compliance 2 out of last 3 years	Improve adult returns
en-egg to eyed-egg survival as compared with blished goal		✓			Review of records; in compliance 4 out of last 4 years	
d-egg to fry survival as compared with established l		✓			Review of records; in compliance 4 out of last 4 years	
to smolt survival as compared with established goal		✓			Review of records; in compliance 3 out of last 3 years	
duction as compared with established goal		✓			Review of records; in compliance 3 out of last 3 years	
cent survival (smolt to adult) as compared with blished goal				✓	Review of records; in compliance 1 out of last 5 years	Improve adult returns
nber of eggs, fry, fingerlings, smolts, and/or adults meet basinwide needs		✓			Review of records/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Temperature</b>  Does your water temperature meet the criteria for spawning?  Does your water temperature meet the criteria for incubation?  Does your water temperature meet the criteria for rearing?		  ✓   		 ✓   ✓   	To meet criteria need to: Chill 1,200 gpm by 9 °F (Speelyai)  Review of records/Discussion  To meet criteria need to: Heat 7,500 gpm by 8 °F (Lewis River) Chill 7,500 gpm by 2 °F (Lewis River)  To meet criteria need to: Heat 2,000 gpm by 5 °F (Speelyai) Chill 2,000 gpm by 2 °F (Speelyai)	None      None
<b>Dissolved gases</b>  Does the oxygen level near saturation?  Does the dissolved nitrogen level less than saturation?		 ✓  ✓			 Review of records/Discussion  Review of records/Discussion	
<b>Chemistry</b>  Ammonia (un-ionized) Carbon Dioxide Chlorine pH Copper Hydrogen Sulfide Iron Zinc			 ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓		No data See above See above See above See above See above See above See above See above	Run analysis See above See above See above See above See above See above See above
<b>Turbidity</b>  Does your turbidity meet the criteria?			 ✓		No data	Run analysis

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Alkalinity and hardness</b>						
Does your alkalinity and hardness meet the criteria?			✓		No data	Run analysis
<b>Nitrite</b>						
Does your nitrite meet the criteria?			✓		No data	Run analysis
<b>Pesticide Contaminants</b>						
Aldrin			✓		No data	Run analysis
Dieldrin			✓		See above	See above
Heptachlor			✓		See above	See above
Chlordane			✓		See above	See above
Methoxychlor			✓		See above	See above
Endosulfan			✓		See above	See above
Malathion			✓		See above	See above
Parathion			✓		See above	See above
<b>Disease</b>						
What portions of the hatchery have disease-free water?						
Adult holding				✓	Inspection of facilities/Discussion	None
Incubation				✓	Inspection of facilities/Discussion	See above
Early rearing				✓	Inspection of facilities/Discussion	See above
Rearing				✓	Inspection of facilities/Discussion	See above
Others	✓					

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Alarm Systems</b>						
Do the following areas have alarms?						
Intake		✓			Inspection of facilities/Discussion	
Large rearing ponds and adult holding ponds		✓			Inspection of facilities/Discussion	
Raceway headboxes and rearing ponds		✓			Inspection of facilities/Discussion	
Incubation facilities		✓			Inspection of facilities/Discussion	
Quarantine areas and facilities	✓				No quarantine areas and facilities	
Water treatment systems	✓				No water treatment systems	
Security				✓	Inspection of facilities/Discussion	Install security alarms at Lewis River and Speelyai Hatcheries
Are there outside systems and buzzers in onsite residences?		✓			Discussion	
Are water flow alarms checked daily?				✓	Review of records/Discussion	Check flow alarms daily
Are all other alarms checked weekly?		✓			Discussion	
Is there a log of alarms for emergencies, tests, and maintenance requirements?		✓			Review of records/Discussion	
Are telephone pagers used?				✓	Discussion	Purchase telephone pagers for 8 staff
<b>Adult collection and holding facilities</b>						
Do you meet the adult holding criteria?		✓			Review of records/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>habitation facilities</b>  Type 1: <u>Vertical stack</u> Do you have an adequate number of units for the overall program?		✓			Inspection of facilities/Discussion	
Type 2: <u>Deep troughs</u> Do you have an adequate number of units for the overall program?		✓			Inspection of facilities/Discussion	
<b>rearing facilities</b>  Type 1: <u>Raceways (Lewis River)</u> Do you have an adequate number of units for the overall program?		✓			Inspection of facilities/Discussion	
Type 2: <u>Raceways (Speelyai)</u> Do you have an adequate number of units for the overall program?		✓			Inspection of facilities/Discussion	
Type 3: <u>Rearing Ponds (Lewis River)</u> Do you have an adequate number of units for the overall program?		✓			Inspection of facilities/Discussion	
Type 4: <u>Rearing Ponds (Speelyai)</u> Do you have an adequate number of units for the overall program?				✓	Inspection of facilities/Discussion	See PM #19
Type 5: <u>Net pens</u> Do you have an adequate number of units for the overall program?		✓			Inspection of facilities/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Screening facilities</b>						
Do you meet the approach velocity criteria?			✓		Inspection of facilities/Discussion	Replace screens at Speelyai Hatchery (9,200 gpm)
Are the fish screens regularly cleaned?				✓	Inspection of facilities/Discussion	See above
Does the screen mesh meet screen opening criteria?				✓	Inspection of facilities/Discussion	See above
Are rearing containers double screened for fish that should not be released to adjacent water?	✓				Release on-station	
<b>Predator control facilities</b>						
Are your predation control facilities effective?		✓			Inspection of facilities/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>d storage facilities and quality control</b>						
Does the storage of dry/semi-moist/moist foods (dry<12%; semi-moist 12-20%; moist >20% moisture) follow food manufacturer's recommendations?		✓			Inspection of facilities/Discussion	
Does a regional quality control officer oversee production procedures and monitor:						
Verification by feed manufacturer that ingredients meet specifications?				✓	Discussion	Conduct IHOT QA/QC tests for feed preparation
Ensure feed does not contain unwanted drugs or other additives?				✓	Discussion	See above
Analyze ingredients contained in the final food product to ensure that feed specifications have been met?				✓	Discussion	See above
Are the foods stored and handled according to the following criteria?						
Moist pellets should not exceed 10 °F at point of delivery.		✓			Discussion	
Moist pellets should be removed from freezer just prior to feeding.		✓			Discussion	
Do not leave buckets of feed or feed containers outside exposed to light or heat.		✓			Discussion	
Open bags of feed should be fed within 1 to 2 days except when feeding small groups of fish.		✓			Discussion	
Automatic feeder hoppers and bulk storage facilities should be insulated against excessive temperatures (80°F and above).	✓				None in use	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Release facilities</b>						
Do the release facilities ensure that fish are not subjected to adverse conditions?		✓			Inspection of facilities/Discussion	
<b>Pollution abatement facilities</b>						
Do the pollution abatement facilities meet all federal and state regulations (or good engineering practice)?		✓			Inspection of facilities/Discussion	
Are pollution abatement facilities operated correctly?		✓			Discussion	
<b>Transportation facilities</b>						
Are the transport systems adequate to meet IHOT performance measures for transportation practices?		✓			Inspection of facilities/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Broodstock selection practices</b>						
Is the donor selection process document attached? (PM #40a)	✓				Existing program; does not apply	
Was the donor selection outline followed in selecting the hatchery broodstock? (PM #40b-c)	✓				Existing program; does not apply	
<b>Spawning practices</b>						
Were the appropriate number of spawners, male/female ratios, and fertilization protocols used? (PM #42c-g)		✓			Review of records/Discussion	
<b>Incubation practices</b>						
Are specific incubation standards listed in the hatchery operations plan?				✓	Reviewed IHOT Operations Plan	Develop specific incubation standards for the IHOT Operations Plan
Are incubation practices written?		✓			See above	
Incubation Type 1: <u>Vertical stack</u> (see PM #8) you meet the loading and flow criteria?			✓		Review of records/Discussion	Follow IHOT flow criteria or revise criteria
Incubation Type 2: <u>Deep troughs</u> (see PM #8) you meet the loading and flow criteria?			✓		Review of records/Discussion	See above

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Rearing practices</b>						
specific rearing standards listed in the hatchery operations plan?				✓	Review IHOT Hatchery Operations Plan	Develop specific rearing standards for the IHOT Operations Plan
rearing practices written?		✓			See above	
Rearing Unit Type 1: <u>Raceways -Lewis River</u> (see PM #9)						
Do you meet the density and DI criteria?		✓			Review of records/Discussion	
Do you meet the Loading and FI criteria?		✓			Review of records/Discussion	
Rearing Unit Type 2: <u>Raceways - Speelyai</u> (see PM #9)						
Do you meet the density and DI criteria?		✓		✓	Review of records/Discussion	Reduce program at Speelyai Hatchery or revise piping system to provide more water to the raceways
Do you meet the Loading and FI criteria?					Review of records/Discussion	
Rearing Unit Type 3: <u>Rearing ponds -Lewis</u> (see PM #9)						
Do you meet the density and DI criteria?		✓		✓	Review of records/Discussion	Reduce program at Lewis River Hatchery or revise piping system to provide more water to the rearing ponds
Do you meet the Loading and FI criteria?					Review of records/Discussion	
Rearing Unit Type 4: <u>Rearing ponds -Speelyai</u> (see PM #9)						
Do you meet the density and DI criteria?				✓	Review of records/Discussion	Provide additional space and flow for rearing ponds at Speelyai or change program at Speelyai Hatchery
Do you meet the Loading and FI criteria?				✓	Review of records/Discussion	See above
Rearing Unit Type 5: <u>Net pens</u> (see PM #9)						
Do you meet the density and DI criteria?	✓				Not used for this program	
Do you meet the Loading and FI criteria?	✓				See above	
<b>Smolt quality</b>						
Do you produce a high quality smolt?				✓	Density too high; have begun to reduce program	None

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Health management practices</b>						
Are the monthly hatchery monitoring visits being conducted? (PM #26)		✓			Review of records/Discussion	
Are the annual broodstock inspections being conducted? (PM #27)		✓			Review of records/Discussion	
Is there pathogen-free water (PM #5h) and are the sanitation procedures being followed? (PM #28)				✓	Review of records/Discussion	See PM #5h
Are the following water quality parameters within criteria? (PM #5a-5g)						
Water temperature				✓	Review of records/Discussion	See PM #5a
Dissolved gases		✓			Review of records/Discussion	
Chemistry			✓		Review of records/Discussion	See PM #5c
Turbidity			✓		Review of records/Discussion	See PM #5d
Alkalinity and hardness			✓		Review of records/Discussion	See PM #5e
Nitrite			✓		Review of records/Discussion	See PM #5f
Contaminants			✓		Review of records/Discussion	See PM #5g
Are rearing standards being followed? (PM #19)				✓	Review of records/Discussion	See PM #19
Are egg and fish transfer/release requirements met? (PM #31)		✓			Review of records/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p><b>Do hatchery performance meet requirements defined in the regional hatchery policies and in the basin and hatchery plans for the following areas?</b></p> <p><b>Percent smoltification</b></p> <p>Do you measure percent smoltification?</p> <p>Do you have a smoltification goal?</p> <p>Did you meet the smoltification criteria?</p>			✓	✓ ✓	<p>Discussion</p> <p>Discussion</p> <p>Discussion</p>	<p>Develop smoltification goal and monitor</p> <p>See above</p> <p>See above</p>
<p><b>Rearing density (prior to release)</b></p> <p>Did you meet the rearing density criteria just prior to release?</p>		✓			Review of records/Discussion	
<p><b>Disease condition (at release)</b></p> <p>Did you meet all disease regulations just prior to release?</p>		✓			Review of records/Discussion	
<p><b>Release number (at release)</b></p> <p>Did you meet the release number goal?</p>		✓			Review of records/Discussion	
<p><b>Fish size at release</b></p> <p>Did you meet the size goal?</p>		✓			Review of records/Discussion	
<p><b>Release date of release</b></p> <p>Did you meet the release date goal?</p>		✓			Review of records/Discussion	
<p><b>Release location of release</b></p> <p>Did you release the fish at the specified location?</p>		✓			Review of records/Discussion	
<p><b>Are fish reared in the subbasin or acclimated in the subbasin?</b></p> <p>Are the fish reared in the subbasin?</p> <p>Are the fish acclimated in the subbasin?</p>				✓ ✓	<p>Discussion. "No" applies to those groups (1/3 of program) hauled upriver</p> <p>See above</p>	<p>Build acclimation ponds for fish released in upper Columbia River Basin</p> <p>See above</p>
<p><b>Is the release strategy appropriate for the program?</b></p>		✓			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Transportation facilities</b>						
Do transportation equipment and personnel receive disinfection before and after use?		✓			Discussion	
Is the fish tank interior disinfected using a solution of 100 ppm active chlorine for 30 minutes minimum or formaldehyde gas generation method (relative humidity of 60% for 2 hrs)?		✓			Discussion	
Is the exterior of the fish transport vehicle disinfected using high pressure steam (115-130°C), high temperature acid, or with 200 ppm chlorine for 30 minutes?				✓	Discussion	Follow IHOT protocols for disinfection of interiors and exteriors of transport vehicle
Is the fish transport vehicle (cab) disinfected using 600 ppm quaternary ammonia compounds (1.5 ml of 50% stock solution/liter water)?				✓	Discussion	See above
Is other equipment disinfected including fish pumps, nets, egg sorters, waders, boots, rain gear, hoses and other equipment using one of the following solutions?  200 ppm chlorine for 30 minutes 600 ppm quaternary ammonia compound for 30 minutes 200 ppm iodophor solution for 10 minutes		✓			Discussion	
Do personnel wear protective garments when handling fish eggs or cultural water?		✓			Discussion	
Do the fish transport truck/chassis and tank/unit receive an inspection and service prior to the release season?		✓			Discussion	
Is a daily service inspection completed before starting pump and leaving for the day?		✓			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Transportation facilities</b>						
Does the fish transport unit receive an inspection prior to loading?		✓			Discussion	
Does a pre-loading inspection covering tank water level, pumps or aerators, oxygen injection system settings, displacement gauge, and truck loading/hauling density tables checked and reviewed occur prior to loading fish in the transport unit?		✓			Discussion	
Do hauling criteria include checking the fish 45 minutes to 1 hour after loading?		✓			Discussion	
When fish are active and systems are functioning properly, is the oxygen concentration reduced and maintained at approximately 8 ppm?		✓			Discussion	
Is water temperature in the transportation unit maintained within the 42-48 °F range?		✓			Discussion	
Do fish releasing procedures include the following criteria?						
Releasing the fish at the correct release site or into the correct water body.		✓			Discussion	
Tempering or the difference between the liberation tank and the target water body should not exceed 10°F.		✓			Discussion	
The liberation hose should be angled so that fish gently hit the water. Using a tripod is a method of ensuring the hose will stay at the proper angle.		✓			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Evaluation practices</b>						
Has the hatchery conducted fishery contribution studies?						
Determine the requirements for evaluating and improving management programs?		✓			Discussion	
Develop guidelines that define the geographical area and identify component stocks (hatchery and/or wild) that comprise the management unit?		✓			Discussion	
Develop guidelines that define if the proper stocks of fish are currently being used?		✓			Discussion	
Determine which management units contribute to a specific fishery and the time periods of those contributions?		✓			Discussion	
Determine the relative contributions of the various management units to a specific fishery over the different time periods?		✓			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>ining practices</b>						
Does the hatchery have a training schedule for its staff?		✓			Review of records/Discussion	
Does each staff member have a personal training plan approved by a supervisor and reviewed annually?		✓			Review of records/Discussion	
Does the hatchery routinely exchange training details between other hatcheries and agencies?		✓			Review of records/Discussion	
Does the hatchery encourage and reward off-duty training of staff?		✓			Review of records/Discussion	
Does the hatchery conduct monthly staff meetings?		✓			Review of records/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>monthly hatchery monitoring visits being conducted by a qualified fish health specialist as described below?</b>  Conduct visit at least monthly  Monitoring conducted by qualified fish health specialist  Examine a representative sample of healthy and moribund fish from each lot.  Review fish culture practices with hatchery manager.  Report finding and results of necropsies on standard form.  Recommend appropriate drug or chemical treatment.  Summarize fish health status or stock prior to release or transfer to another facility.		✓  ✓  ✓  ✓  ✓  ✓			Review of records/Discussion  Review of records/Discussion  Review of records/Discussion  Review of records/Discussion  Review of records/Discussion  Review of records/Discussion	
<b>all of the functions of the hatchery yearly monitoring visits being completed as described below?</b>  Annually examine each broodstock for the presence of reportable viral pathogens.  Annually screen each salmon broodstock for the presence of <i>Renibacterium salmoninarum</i> .  Conduct inspection by or under the supervision of qualified fish health specialist.		✓  ✓  ✓			Review of records/Discussion  Review of records/Discussion  Review of records/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>Are hatchery sanitation procedures following accepted sanitation procedures?</b>						
Are there any sources of pathogen-free water, especially for incubation and early rearing?		✓			Discussion	
Are the hatchery sanitation procedures understood and being followed as described below?						
Disinfect/water harden eggs in iodophor?		✓			Inspection of facilities/Discussion	
Are foot baths containing disinfectant placed at the incubation facility's entrance and exit?		✓			Inspection of facilities/Discussion	
Is equipment and rain gear utilized in broodstock handling or spawning sanitized prior to its use elsewhere in the hatchery?				✓	Inspection of facilities/Discussion	Sanitize equipment and rain gear utilized in broodstock handling or spawning prior to its use elsewhere in the hatchery
Is equipment used to collect dead fish sanitized prior its use in another pond and/or lot of fish?		✓			Inspection of facilities/Discussion	
Is equipment, including vehicles used to transfer fish between facilities, disinfected prior to use with any other fish lots or at any other location?		✓			Inspection of facilities/Discussion	
Are rearing vessels sanitized after fish are removed and prior to introducing a new fish lot or stock?				✓	Done after experiencing an epizootic	Sanitize rearing vessels after fish are removed and prior to introducing a new fish lot or stock
Are dead fish properly disposed of?		✓			Inspection of facilities/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>water quality parameters being followed?</b>						
Are the following water quality parameters within criteria? (PM #5a-5g)						
Water temperature		✓		✓	Review of records/Discussion	See PM #5a
Dissolved gases			✓		Review of records/Discussion	See PM #5b
Chemistry			✓		Review of records/Discussion	See PM #5c
Turbidity			✓		Review of records/Discussion	See PM #5d
Alkalinity and hardness			✓		Review of records/Discussion	See PM #5e
Nitrite			✓		Review of records/Discussion	See PM #5f
Contaminants			✓		Review of records/Discussion	See PM #5f
io to PM #21						
<b>incubation and rearing standards being followed?</b>						
Are the incubation practices following the IHOT incubation criteria? (PM #18)				✓	Review of records/Discussion	See PM #18
Are the rearing practices following the IHOT criteria? (PM #19)				✓	Review of records/Discussion	See PM #19
io to rearing practices PM #18-PM #19						
<b>egg and fish transfer/release requirements met?</b>		✓			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
Is the hatchery's program outlined in a subbasin management plan?		✓			Columbia Basin System Planning Production Plan and FERC Agreement 953-000	
Is it consistent with subbasin plan PM #1						
Is the hatchery operating under a current hatchery operational plan?		✓			Review IHOT Operations Plan	
Is it consistent with operational plan PM #2						
Is the hatchery monitoring and evaluation plan in place?		✓				
Is it consistent with hatchery monitoring and evaluation plan PM #3						

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p>Does the hatchery program meet requirements established in the regional hatchery policies and basin planning documents in the following areas: species, stock, broodstock collection location, broodstock numbers, broodstock collection strategy, spawning and egg-take protocols?</p> <p>Does the hatchery program meet the requirements for the following?</p>						
Species protocols (PM #1)		✓			Review of records/Discussion	
Stock protocols (PM #1)		✓			Review of records/Discussion	
Broodstock collection location protocols (PM #41b for existing program; PM #39b for new program )		✓			Review of records/Discussion	
Broodstock numbers protocols (PM #42c)		✓			Review of records/Discussion	
Broodstock collection strategy protocols (PM #41b-d for existing program; PM 39b-f for new program)		✓			Review of records/Discussion	
Spawning protocols (PM #42d-e)		✓			Review of records/Discussion	
Egg-take protocols (PM #42f-g)		✓			Review of records/Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<p><b>Do the hatchery's performance meet requirements defined in the regional hatchery policies and in the subbasin and hatchery plans for the following areas: percent smoltification, rearing density, disease condition, and the number, size date(s), and location of release?</b></p> <p>Percent smoltification (PM #22a1)</p> <p>Rearing density (PM #22a2)</p> <p>Disease condition (PM #22a3)</p> <p>Number at release (PM #22a4)</p> <p>Size at release (PM #22a5)</p> <p>Date of release (PM #22a6)</p> <p>Location of release (PM #22a7)</p>				✓	Review of records/Discussion	See PM #22a1
		✓			Review of records/Discussion	
		✓			Review of records/Discussion	
		✓			Review of records/Discussion	
		✓			Review of records/Discussion	
		✓			Review of records/Discussion	
		✓			Review of records/Discussion	
<p><b>Are fish reared in the subbasin or acclimated in the subbasin?</b></p> <p>PM #22b</p>				✓	Discussion. See PM #22b	See PM #22b
<p><b>Is the release strategy appropriate for the program?</b></p> <p>PM #22c</p>		✓			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
<b>new programs, has a broodstock collection plan developed?</b>						
Is the broodstock collection plan written?	✓				Existing Program; does not apply	
For a non-captive broodstock program:	✓				Existing Program; does not apply	
Was an unbiased, representative sample collected?						
Was the recommended number of broodstock collected?	✓				Existing Program; does not apply	
For a captive broodstock program:						
Were captive brood progeny excluded as donors for propagating the next generation of the captive broodstock program?	✓				Existing Program; does not apply	
Were full-sib crosses avoided?	✓				Existing Program; does not apply	
Is the broodstock collection plan understood and being followed by staff?	✓				Existing Program; does not apply	
<b>a new program, was the donor selection outline followed in selecting the hatchery broodstock?</b>						
Is a donor selection plan written?	✓				Existing Program; does not apply	
Was the donor selection outline followed in selecting the broodstock?	✓				Existing Program; does not apply	
Was the target stock recommended in the donor selection process actually used?	✓				Existing Program; does not apply	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
existing programs, were the broodstock collection cedures followed?						
Is the broodstock collection plan written?		✓			Review broodstock collection plan	
Does the broodstock collection plan follow the guideline:						
Was an unbiased, representative sample collected?		✓			Discussion	
Was the recommended number of broodstock collected?		✓			Discussion	
Were the broodstock collection procedures in hatchery operation plan understood and followed?		✓			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
Is the appropriate number of spawners, male/female ratio, and fertilization protocols used?						
Are the spawning protocols written?		✓			Review of spawning protocols	
Are daily or weekly spawning logs available?		✓			Review of records	
Was the appropriate number of spawners used?		✓			Discussion	
Did you attempt to spawn all collected broodstock and randomize mating with respect to age class, and other traits?		✓			Discussion	
Was the sex-ratio within the limits given in the performance standards?		✓			Discussion	
Were the fertilization protocols followed?		✓			Discussion	
If the hatchery needed to reduce the number of eggs retained, was this done by representative sampling of each male/female cross?		✓			Discussion	

Description of Performance Measure	Compliance Status				Basis for Compliance or Non-Compliance	Remedial Action Needed for Compliance
	N/A	Yes	?	No		
Where a genetics monitoring and evaluation program is available?				✓	Manual provided; hatchery-specific plan not provided	Develop approved genetics M&E plan
Does the plan address the following elements listed in HOT:						
Does the program have elements needed to meet evaluation goals 1-4?				✓	Discussion	See above
Has a qualified geneticist reviewed and endorsed the program (goal 5)?				✓	Discussion	See above
Will the program collect the data and maintain the records needed to evaluate compliance on an ongoing basis (goal 5)?				✓	Discussion	See above
Is the program understood and followed by staff?				✓	Discussion	See above

## Section 4

# Remedial Actions

Based on the compliance status for each performance measure, remedial actions were developed. The required remedial actions are organized into five categories. The types of categories range across a spectrum from those actions that are beyond human control, to those that require a change in agency policy or procedures, to those that involve a significant capital cost to put in place. The following are the five types of remedial actions identified under phase 1 of the audit:

**The Five Types of Remedial Actions**

Type	Description
1	Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery
2	Remedial actions requiring changes in agency policies or procedures
3	Remedial actions requiring changes in monitoring coverage or interval
4	Remedial actions requiring significant capital expenditures
5	Remedial actions that may require significant capital expenditures but are not clearly definable at this time

### Remedial Actions at Lewis River/Speelyai Hatcheries - Coho (Type S)

This section presents the corrective actions required to bring the Lewis River/Speelyai Hatcheries - Coho (Type S) program into compliance with IHOT performance measures. The remedial actions suggested here are just that, suggestions developed by the Montgomery Watson Audit Team. For some non-compliance areas, other remedial actions could be proposed. The required remedial actions are cross-referenced to each IHOT performance measure that was not in compliance. Where appropriate, the costs associated with the remedial actions are also presented (Table 3).

The cost estimates presented in this section are based on professional experience from similar projects. In most cases, only a lump-sum figure is presented, and detailed take-off lists have not been prepared. The cost estimates are essentially order of magnitude estimates ( $\pm 40\%$ ).

More importantly, the suggested remedial activities may also present several levels of action. Optional actions have been listed for several problems. These optional actions are desirable for either operational or safety considerations.

**Table 3. Remedial Actions Required at Lewis River/Speelyai Hatcheries - Coho (Type S)**

<b>Remedial Action Required</b>	<b>Cost</b>	<b>PMs<sup>1</sup></b>
<b>Type 1</b> - Non-compliance issues resulting from items beyond human control or Performance Measures not relevant for this hatchery		
Improve adult returns	----	4c. 4h
<b>Type 2</b> - Remedial actions requiring changes in agency policies or procedures		
Check flow alarms daily	----	6
Conduct IHOT QA/QC tests for feed preparation	----	12
Follow IHOT incubation flow criteria or revise	----	18
Develop specific incubation and rearing standards for the IHOT Operations Plan	----	18-19
Develop smoltification goal and monitor	----	22a1
Follow IHOT protocols for disinfection of interiors and exteriors of transport vehicle	----	23
Sanitize equipment and rain gear utilized in broodstock handling or spawning prior to its use elsewhere in the hatchery	----	28
Sanitize rearing vessels after fish are removed and prior to introducing a new fish lot or stock	----	28
Develop approved genetics M&E plan	----	43
<b>Type 3</b> - Remedial actions requiring changes in monitoring coverage or interval		
Run analysis for water quality parameters, turbidity, alkalinity, hardness, nitrite, and contaminants	----	5c-5g

<sup>1</sup> PMs are performance measures that were extracted from the IHOT 1995 report. The IHOT performance measures are listed in Table 2 (Section 3 of this report) in numerical order.

Remedial Action Required	Cost	PMs <sup>1</sup>
<b>Type 4</b> - Remedial actions requiring significant capital expenditures		
Install security alarms at Lewis River and Speelyai Hatcheries	\$25,000	6
Purchase telephone pagers for 8 staff	\$5,000	6
Replace screens at Speelyai Hatchery (20.5 cfs)	\$200,000	10
Reduce program at Speelyai Hatchery or revise piping system to provide more water to the raceways	\$100,000	
Reduce program at Lewis River Hatchery or revise piping system to provide more water to the rearing ponds	\$75,000	19
Build acclimation ponds for fish released in upper Columbia River Basin	\$1.0 million	22b
<b>Type 5</b> - Remedial actions that may require significant capital expenditures but are not clearly definable at this time		
None	----	

<sup>1</sup> PMs are performance measures that were extracted from the IHOT 1995 report. The IHOT performance measures are listed in Table 2 (Section 3 of this report) in numerical order.

## Hatchery Contribution to Fisheries, Spawning Grounds, and Hatcheries

This section presents the audit findings for the Lewis River/Speelyai Hatcheries - Coho (Type S) program contribution of adult fish to fisheries, local fisheries, spawning grounds, and hatcheries. Data is reported by broodyear. A broodyear refers to the adult contribution from the eggs produced from a single group of spawning adults. For some species, this may include fish caught as 2-, 3-, 4-, 5-, and 6-year old fish. Because of the return distribution and data processing delays, the complete adult contribution for a given broodyear may not be available until 4 to 5 years after the fish have been released from the hatchery.

**Table 4. Adult Contribution to Fisheries, Spawning Grounds, and Hatcheries:  
Lewis River/Speelyai Hatcheries - Coho (Type S)**

Year	Fisheries <sup>1</sup> (Broodyear)	Spawning Grounds <sup>1</sup> (Broodyear)	Hatchery <sup>1</sup> (Broodyear)	Total Combined Contribution <sup>2</sup> (Broodyear)	Smolt to Adult Survival (percent)
1981					
1982					
1983					
1984					
1985					
1986					
1987	765	9	250	1,024	1.39%
1988	2,479	29	1,587	4,095	5.57%
1989	546	2	219	767	1.02%
1990	160	2	80	242	0.32%
1991	3	3	224	230	0.32%
1992					

<sup>1</sup> Data obtained from Missing Production Groups Annual Report or from the Regional Mark Information System database.

<sup>2</sup> Total combined adult contribution; presented when it is not possible to subdivide the contribution into fisheries, spawning grounds, and hatchery contributions.

## Annual Operating Expenditures

The level and detail of annual operating expenditures varies widely depending on hatchery, operating agency, and funding source. When provided, expenditures were presented in terms of personnel costs, operating costs (power, feed, supplies), capital costs, indirect costs charged to the federal government, third-party costs, and other costs. These cost components were summed to determine a total hatchery annual cost. Based on discussion with the hatchery manager, the percent of total hatchery costs allocated to a given program was estimated. The total hatchery costs and the percent of hatchery costs allocated to a given program were used to compute the cost of a given program. Table 5 shows the annual operating expenses for the Lewis River/Speelyai Hatcheries - Coho (Type S) program. For programs that occur at more than one facility (as shown on Table 1 in Section 3 of this report), the cost breakdown for the component(s) at each facility is presented in separate tables (Table 5a).

**Table 5. Annual Operating Expenses: Lewis River/Speelyai Hatcheries - Coho (Type S)**

Hatchery	1994	1995	1996
1. Lewis River/Speelyai	\$178,795	\$152,857	\$368,554
2.			
3.			
4.			
5.			
<b>Total Program Costs</b>	<b>\$178,795</b>	<b>\$152,857</b>	<b>\$368,554</b>

The total expenditures for the Lewis River/Speelyai Hatcheries are presented in Table 6 by program. The detailed breakdown of program expenditures at this hatchery are presented in separate tables (Table 6a, 6b, and 6c).

**Table 6. Annual Operating Expenses - Lewis River/Speelyai Hatcheries**

Program	1994	1995	1996
1. Spring Chinook	\$608,316	\$536,834	\$566,205
2. Coho (Type N)	\$239,421	\$531,943	\$548,372
3. Coho (Type S)	\$178,795	\$152,857	\$368,554
4.			
5.			
<b>Total Hatchery Costs</b>	<b>\$1,027,562</b>	<b>\$1,222,858</b>	<b>\$1,486,104</b>

**Table 5a. Annual Operating Expenses: Lewis River/Speelyai Hatcheries - Coho (Type S)**

**Expenditure Occurring at Lewis River/Speelyai Hatcheries**

<b>Component</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>
Personnel Costs	\$242,208	\$259,378	\$231,569
Operational Costs	\$620,455	\$536,488	\$467,759
Capital Costs	\$248,000	\$244,000	\$600,000
Indirect Costs	\$164,899	\$182,992	\$186,776
Lumped Hatchery Costs <sup>1</sup>			
Lumped Third-Party Costs			
<b>Total Hatchery Costs</b>	<b>\$1,027,562</b>	<b>\$1,222,858</b>	<b>\$1,486,104</b>
<b>Source of Funds</b>			
PacifiCorp	<b>66%</b>	<b>66%</b>	<b>66%</b>
NMFS	<b>34%</b>	<b>34%</b>	<b>34%</b>
Program Production (lb)	61,102	64,637	124,836
Total Production (lb)	350,256	516,530	502,299
Program as Percent of Total	17.4%	12.5%	24.8%
<b>Program Costs</b>	<b>\$178,795</b>	<b>\$152,857</b>	<b>\$368,554</b>

<sup>1</sup> When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.

**Table 6a. Detailed Expenditures at Lewis River/Speelyai Hatcheries by Program**

**Spring Chinook**

<b>Component</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>
Personnel Costs	\$242,208	\$259,378	\$231,569
Operational Costs	\$620,455	\$536,488	\$467,759
Capital Costs	\$248,000	\$244,000	\$600,000
Indirect Costs	\$164,899	\$182,992	\$186,776
Lumped Hatchery Costs <sup>1</sup>			
Lumped Third-Party Costs			
<b>Total Hatchery Costs</b>	<b>\$1,027,562</b>	<b>\$1,222,858</b>	<b>\$1,486,104</b>
<b>Source of Funds</b>			
PacifiCorp	<b>66%</b>	<b>66%</b>	<b>66%</b>
NMFS	<b>34%</b>	<b>34%</b>	<b>34%</b>
Program Production (lb)	207,364	227,194	191,622
Total Production (lb)	350,256	516,530	502,299
Program as Percent of Total	59.2%	43.9%	38.1%
<b>Program Costs</b>	<b>\$608,316</b>	<b>\$536,834</b>	<b>\$566,205</b>

<sup>1</sup> When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.

**Table 6b. Detailed Expenditures at Lewis River/Speelyai Hatcheries by Program**  
**Coho (Type N)**

<b>Component</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>
Personnel Costs	\$242,208	\$259,378	\$231,569
Operational Costs	\$620,455	\$536,488	\$467,759
Capital Costs	\$248,000	\$244,000	\$600,000
Indirect Costs	\$164,899	\$182,992	\$186,776
Lumped Hatchery Costs <sup>1</sup>			
Lumped Third-Party Costs			
<b>Total Hatchery Costs</b>	<b>\$1,027,562</b>	<b>\$1,222,858</b>	<b>\$1,486,104</b>
<b>Source of Funds</b>			
PacifiCorp	<b>66%</b>	<b>66%</b>	<b>66%</b>
NMFS	<b>34%</b>	<b>34%</b>	<b>34%</b>
Program Production (lb)	81,790	224,699	185,841
Total Production (lb)	350,256	516,530	502,299
Program as Percent of Total	23.3%	43.5%	36.9%
<b>Program Costs</b>	<b>\$239,421</b>	<b>\$531,943</b>	<b>\$548,372</b>

<sup>1</sup> When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.

**Table 6c. Detailed Expenditures at Lewis River/Speelyai Hatcheries by Program  
Coho (Type S)**

<b>Component</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>
Personnel Costs	\$242,208	\$259,378	\$231,569
Operational Costs	\$620,455	\$536,488	\$467,759
Capital Costs	\$248,000	\$244,000	\$600,000
Indirect Costs	\$164,899	\$182,992	\$186,776
Lumped Hatchery Costs <sup>1</sup>			
Lumped Third-Party Costs			
<b>Total Hatchery Costs</b>	<b>\$1,027,562</b>	<b>\$1,222,858</b>	<b>\$1,486,104</b>
<b>Source of Funds</b>			
PacifiCorp	<b>66%</b>	<b>66%</b>	<b>66%</b>
NMFS	<b>34%</b>	<b>34%</b>	<b>34%</b>
Program Production (lb)	61,102	64,637	124,836
Total Production (lb)	350,256	516,530	502,299
Program as Percent of Total	17.4%	12.5%	24.8%
<b>Program Costs</b>	<b>\$178,795</b>	<b>\$152,857</b>	<b>\$368,554</b>

<sup>1</sup> When it was not possible to obtain a detailed cost breakdown from an agency or third party, the undivided costs were entered here.